:A tool for calculating long-line profitability

The Secretariat of the Pacific Community wishes to thank the United Nations Development Programme (UNDP) for its financial support which made the development of this computer program possible.

The software was developed by Brian Egerton and David Peacock of Ivanhoe Associates with advice from Alastair Robertson and staff of the Fisheries Training Section of the SPC.

The user manual was written by Alastair Robertson.

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Original text: English

Secretariat of Pacific Community Cataloguing-in-publication data.

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Vessel economics: a tool for calculating longline profitability

1.Longlining (Fisheries) 2.Fisheries-Economics aspects 3. Ships-Accounting

1. Title 11. Secretariat of the Pacific Community

338.3727 AACR2

ISBN 982-203-705-8

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Prepared for publication by Karen Jones, Archetype Creative Services Ltd, Nelson

Printed by Printhouse Nelson Ltd, NZ, 1999.

SPC FISHERIES ECONOMICS SOFTWARE

This is a comprehensive program developed as a tool to understand and manage the financial aspects of long-line fishing vessel operation. In a slightly restricted form, it can be used for any type of fishing vessel.

The program will be useful to skippers, owners and any others who have an interest in vessel economics. It gives a quick and accurate indication of vessel profitability and can immediately calculate profit variations caused by changing parameters in vessel operation.

The programme is particularly useful in the teaching situation where it can be used to total individual costs to show the cash flow and profit/loss situations. With this achieved, the student may then alter any figure to reflect changed circumstances and the program will immediately show how this affects profit. By this means, the key factors and the most effective ways of increasing profitability are quickly demonstrated.

As the program is based on the decimal system, the financial figures in the program could be US, Australian, New Zealand or Fijian dollars as well as PNG Kina, Vanuatu Vatu, or Samoan Talla, etc.

The wording used in the program, follows financial terminology as much as possible. However, as fishing skippers and others from a non-accounting background will also use this program, some terms have been made more descriptive.

LOADING THE PROGRAM TO YOUR COMPUTER

This program is designed to work on *Windows 95* using a screen with a resolution of 800x600 pixels. If your resolution is less than this, you may not be able to see all of the screen at once.

The procedure for loading the program from the two discs attached is as follows:

Open *Windows95*

Insert Disc No 1 into disc drive

Click on <My Computer> icon

Click on <31/2 Floppy (A)> icon

Click on <Setup.bat> file

Then follow instructions from the screen.

or

Open *Windows 95*

Insert disk 1 into disc drive

Click on <Programs>

Click on <MS DOS Prompt>

Type A: then, <Enter>

Type Setup: then, <Enter>

Then follow instructions from the screen.

OPENING THE PROGRAM FROM YOUR COMPUTER

After loading this program onto your computer as per the instructions above, you can start the program by either:

Opening *Windows 95*.

Opening *Windows Explorer*

Opening the SPC directory you created

Opening the *Vessels Economics* program by double clicking on the Southpac.exe file

This will take you into the welcome window as seen below.

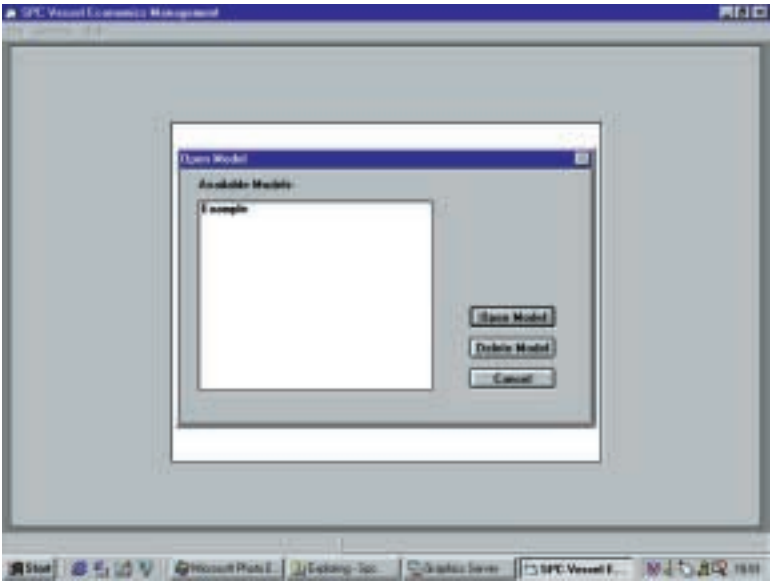
OPENING AND SAVING FILES

Clicking on the File option at the top left hand corner of this screen will bring down the operation options as shown below.

These are:

New Model. This opens the program at a blank income screen, ready for you to create a new model.

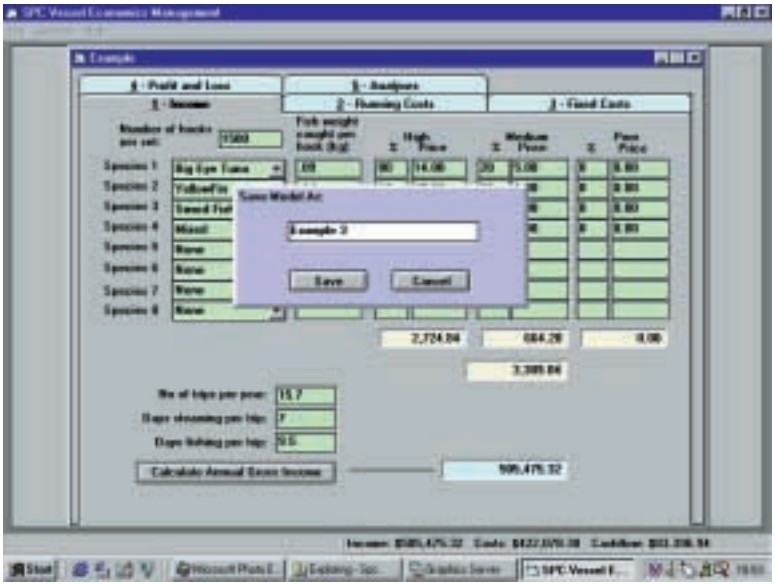
Open Model. This opens a model which has already been created and saved with a name. It takes you to another screen with the options shown below.



On this screen you may open any of the existing models, delete any of the existing models or use the cancel button to return to the menu.

Save. This saves the model on which you are presently working by the name already given. If a name has not already been given then the “Save model as” screen is brought up.

Save As. This brings up another window, as shown below, which allows you to save the model on which you are working by a chosen name.



Close Model. Closes the model on which you are working.

Print Setup. This allows you to configure your printer to print copies of the various graphs associated with the program.

Exit. This closes and exits the program.

HOW TO USE THE PROGRAM

You are in control of this program; you enter the figures and the computer does the calculations. When entering figures in any specific box, a footer in the bottom left hand corner of the screen will advise you of the purpose of that box. You may use the mouse to move from one box to another, or for speed, you may use the <tab> key to jump to the next box. Using the <tab> key or clicking a new box with the mouse records the previous entry into memory for use in the calculations.

The program has five screens:

- Screen 1 calculates income
- Screen 2 calculates the working or running costs
- Screen 3 calculates the fixed costs
- Screen 4 calculates the final profit/loss
- Screen 5 displays these results as graphs.

After all the figures, required for calculating the profit/loss situation, have been entered in all screens for the first, time the computer will display the totals for income, costs, and profit in the profit and loss screen and also as a footer at the bottom right-hand corner of each screen. From this time on, if you change any figure and tab on, or press the mouse button, the computer will immediately recalculate interconnected figures, change these on each screen and display the final totals on the footer on each screen. In this way, after getting some basic figures into the model you can then “play” with options, make changes and have their effects on profit immediately displayed in the bottom right-hand corner of the screen.

To assist in the operation of this program, the boxes have been colour-coded as follows:

A green box is where you insert data, such as fish price, fuel cost, vessel cost, insurance, etc.

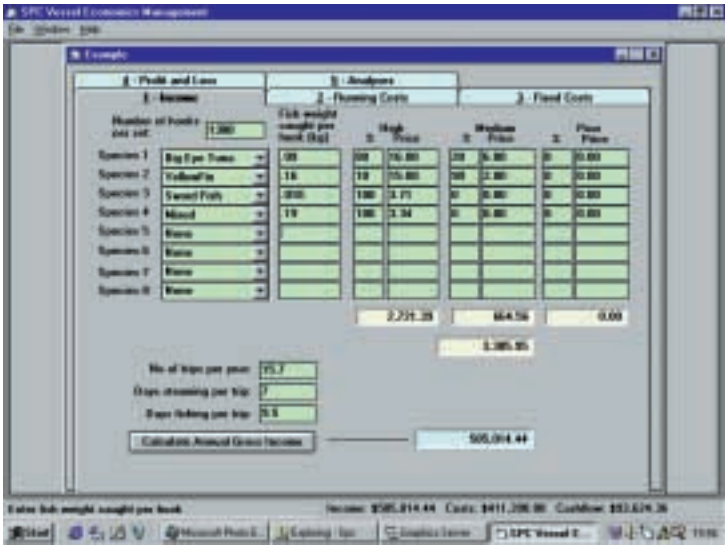
A yellow box shows the result of intermediate calculations. You cannot overwrite yellow boxes. Results will only change if you change the figures in the green boxes.

A blue box shows the sum calculation of several factors, such as, the gross value of the catch, the total cost of fuel, or the depreciation.

Grey boxes are calculating buttons, which you click to get a final calculation. There are only four of these buttons, the <Calculate Annual Gross Income> button, the <Total Annual Running Costs> button, the <Total Annual Fixed Costs> button and the Calculate Profit/Loss> button.

INCOME SCREEN

This screen calculates the Annual Gross Income. It is the first to be shown and should be completed first as many of the calculations which follow on other screens are dependant on the information on this screen e.g. *the annual costs of fuel* (screen 2) is dependant on the *time at sea* (this screen) and the *annual cost of bait* (screen 2) is dependant on the *number of hooks set* and the *number of days fished* (this screen).



As with all of the screens in this program, you insert the basic information in the green boxes and the computer does the calculations and shows the results in the yellow and blue boxes. After you have completed a set of figures, you can calculate the annual gross income by clicking on the grey box. When entering figures in any box, a footer will appear in the bottom left-hand corner explaining what the box contains. Should you make a mistake when entering data, such as forgetting to fill in an important box, or where totals are impossible, the computer will give you an error message and ask you to insert or change the figures.

Number of hooks per set

It is assumed the vessel will complete one set for each fishing day, thus in this box you will enter the average number of hooks your vessel sets each day.

Species and weight of fish caught

You have the option of entering up to eight fish species. The main species are available by clicking the drag-down boxes, other fish species can be added by typing their name into the corresponding green box. The total weight of fish caught per trip is calculated by multiplying the number of hooks per set by the average fish weight caught per hook (this is called the catch per unit of effort or CPUE), by the number of fishing days per trip. You must therefore insert a figure for the CPUE of each species of fish caught. If you do not have an idea of the CPUE for your area, a short table, based on the average data for the Pacific Region, is provided on page 24.

The program gives three price options for each species. These allow for circumstances where there are different prices for different sizes or quality. It can be used to show the effect on profit of poor handling or icing by entering a percentage of fish at medium and poor quality. If the percentage totals in these columns do not add up to 100%, you will get an error message. You can ignore the medium and poor price boxes without affecting the program, as long as the percentage inserted into the high price column is 100%.

Fishing pattern

The fishing pattern is reflected by filling the green boxes for the number of trips per year, the number of days steaming per trip and the number of days fishing per trip. Changing these to reflect more days at sea, or changing fishing grounds, will have a flow-on effect to all of the calculations which come later.

Annual gross income

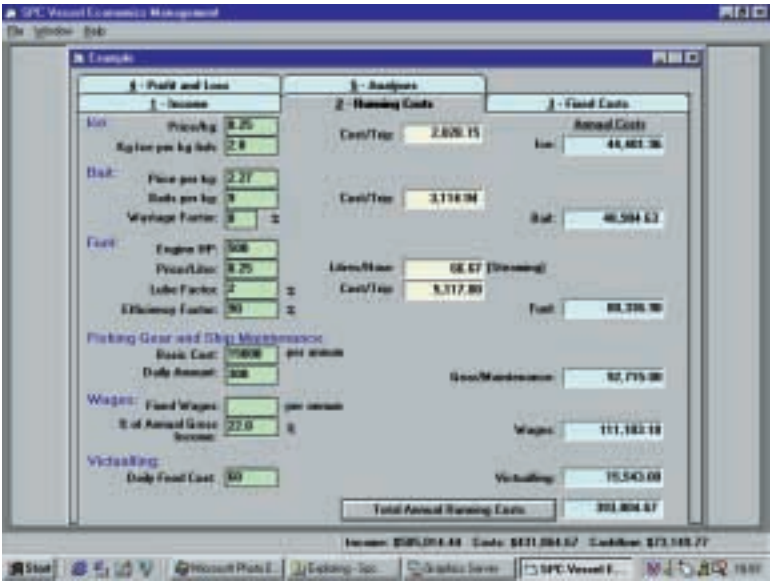
After the catch details have been inserted in the green boxes, clicking on the grey calculate button will total the figures in the yellow boxes to show the income per set but you will also get an error message advising you to fill in the trip details. When these are entered, clicking the calculate button again will give you the totals for Annual Gross Income.

Note. If data is changed in the green boxes, the figures in the yellow and blue boxes will only change automatically if a complete set of data has been entered in the "Running Costs" and "Fixed Costs" screens. Before this has been done, if you wish to see the totals for intermediate changes for the "Income Screen", the grey calculate button should be used.

The annual gross income figure, incorporates all of the previous information. It is based on the number of hooks set per day, the amount and value of fish caught and the number of days fished.

RUNNING COSTS SCREEN

This screen calculates the running costs of the vessel, sometimes called operating costs or variable costs. These are costs which change depending on how many trips the vessel does and on how well it is looked after and operated. In this aspect they differ from the fixed costs, which are costs incurred regardless of what the vessel does.



As with all of the screens in this program, you insert the basic information in the green boxes and the computer does the calculations and shows the results in the yellow and blue boxes. You can change the figures you have inserted in the green boxes at any time and the computer will immediately recalculate and display the totals after you tab on or click on the grey calculate button.

Ice calculation

The ice calculation is based on the total weight of fish caught, as calculated in the Income screen, multiplied by an icing ratio, which you supply, and by the price of ice per kilo, which you also supply. In order to obtain premium quality fish an icing ratio of two kilos of ice to one kilo of fish is recommended.

Bait calculation

Most baits come in 10 or 20 kg cartons with each carton being graded for the size, which gives you the number of baits per carton. With this knowledge, you are required to enter the number of baits per kilo and the price of each kilo of bait. The computer will then calculate the cost of bait per trip (yellow box) and the total cost of bait per year (blue box). To take into account careless use of bait, the program also gives you the opportunity to insert a wastage factor. This is the percentage of bait wasted and not put on hooks.

If you do not have any idea of bait costs, you can refer to the average data supplied on page 24.

The bait calculation is based on putting an individual bait on each hook. The annual cost of bait is calculated by multiplying the number of hooks per set by the cost per individual bait by the number of fishing days per trip, by the number of trips per year, adjusted for the wastage factor, if any.

Fuel calculation

Fuel consumption will vary considerably from vessel to vessel depending on a large variety of factors. Some of these are: the size of the engine; exceeding the designed steaming revs; the match of propeller to vessel and engine; the amount of fouling on the hull; the state of the engine itself (injectors, compression); and the condition of the propeller (no bends or distortion).

The fuel calculation is based on averages obtained from actual vessels in the 100 to 400 HP range and are not alterable other than by adjusting the efficiency factor. The figure is obtained by assuming the engine will be operating at close to maximum efficiency and that fuel consumption while fishing is two thirds of that while steaming.

If you find the annual fuel consumption in the program is smaller than your vessel is actually using, the consumption figure may be increased by lowering the efficiency factor to less than 100%, making your engine burn more fuel. If you find the annual fuel consumption figure is larger than your vessel is actually using, the consumption figure may be decreased by increasing the fuel efficiency factor to an amount more than 100%, making your vessel burn less fuel.

The lube factor shows what you will spend on lubricating oil as a percentage of what you spend on fuel.

Gear and maintenance calculation

The annual cost of gear and maintenance is calculated by adding a fixed annual cost (the major factor being slipping) to a cost per day at sea, multiplied by the number of days at sea per year. The assumption is that you will have some cost regardless but costs will increase the more the vessel is used. These costs will not include extreme circumstances such as running aground or losing the whole long-line.

You are thus required to enter a fixed annual cost and a cost per day and the computer will do the calculation by using the number of days spent at sea from the income screen. Should you not know what these costs might be, refer to the sample data given on page 24.

Wages

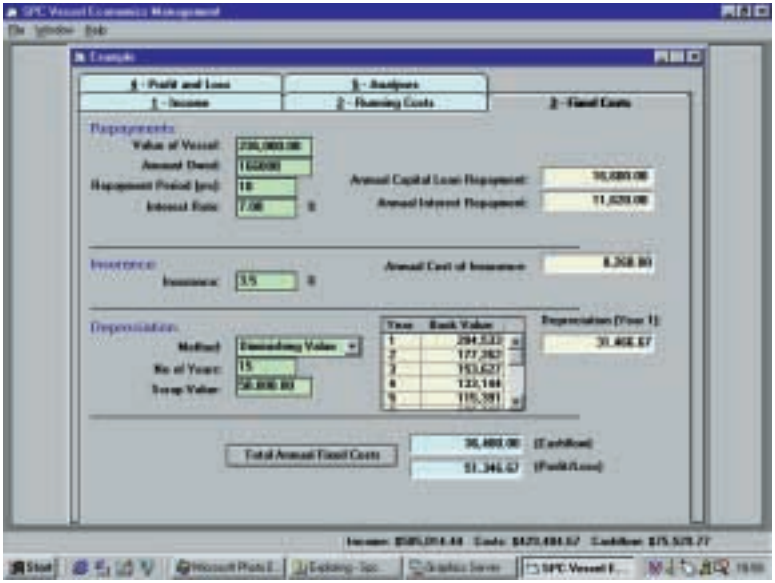
There are several ways of calculating crews' wages, this depends on the personal choice of the operator and crews. In this program wages can be a lump sum per annum, or a percentage of the catch, or a combination of both of these. You are thus required to enter the value of the lump sum payment or a percentage of income, or both if a combination is wished and the computer will calculate the annual wage bill from the figures you have entered. Leaving either box empty or inserting a zero will be acceptable to the computer.

Victualling

Enter the daily cost of victualling the vessel when it is at sea. The computer will calculate the annual cost of victualling by multiplying this figure by the days at sea.

FIXED COSTS SCREEN

Fixed costs are those costs which must be paid regardless of whether the vessel goes to sea or not, and regardless of the gross income of the vessel. They include the interest on the loan, the insurance of the vessel, the annual repayments of the loan and the depreciation of the vessel.



Loan repayments and interest

To calculate the annual loan repayment you enter the value of the vessel, the amount borrowed, the number of years the loan is running for and the rate of interest you are paying on your loan. The computer will calculate and display the Annual Capital Loan Repayment and the Annual Interest Repayment.

Insurance

Marine insurance is calculated as a percentage of the vessel's insured value. This can vary from 3% to 15%, depending on the country and the record of loss in that country or by the individual owner. If you insert a percentage the computer will calculate the Annual Cost of Insurance, based on the vessel value previously entered.

Depreciation

As a vessel gets older it gets worn out and declines in value. This loss in value from one year to the next is called the annual depreciation. Although the owner does not have to pay out any money to cover this depreciation, it is a hidden cost which should be taken into account if a true picture of the profitability is to be known. In countries which have a tax system, the depreciation can be shown as a cost to the owner, which reduces the profit and thus the tax to be paid.

Different equipment depreciate at different rates. A computer or piece of electronic equipment has a very small re-sale value after two or three years, while, over the same period, more durable items can still be worth almost as much as their original value. Most tax systems will allow depreciation at differing rates for different parts of the vessel. The hull of the vessel is often depreciated over fifteen years while the engine is depreciated over ten years. An outboard motor and electronic equipment can be depreciated over three years.

In order to allow for depreciation in this program, the user needs to decide on the period over which the vessel will depreciate and on what it might be worth at the end of that period. Used vessels never depreciate to nothing but usually reach a lower price, at which they can remain for some time. In this program this final value is called the scrap value (this is not accounting terminology).

The program offers two options for calculating the annual depreciation. In the "straight-line" option the difference between the vessel's value and its scrap value is divided by the number of years over which it will depreciate and an annual value for depreciation is found. This value will be the same each year.

The "diminishing value" method is more sophisticated. It is based on the premise that things do not lose their value at the same rate each year. They will drop more value in the first years and this drop in value will level off in subsequent years until they reach a value at which they will remain for a long period.

Total Annual Fixed Costs

This screen shows two figures for the total annual fixed costs:.

1. The cashflow figure which reflect the cash in hand situation

and

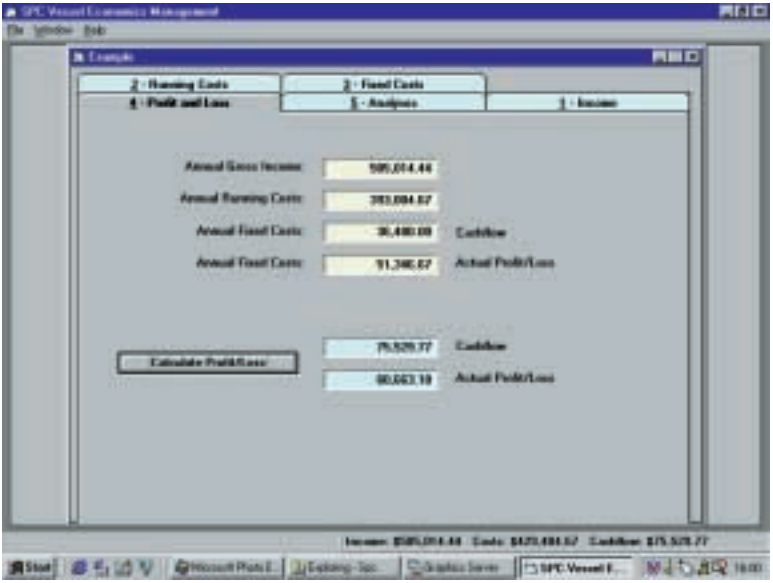
2. The profit/loss figure which gives an indication of how you are actually doing.

With the cashflow figure, when calculating the Total Annual Fixed Costs the depreciation has not been taken into account as no cash payment is made for depreciation. Also the money given to the bank for repayment of the loan on the vessel is shown as money paid out (loss). This is actually a profit as you now own more of the vessel than you did the previous year. The total annual fixed costs (cash flow) shows the amount of cash you will have in your hand at the end of the year but is not a true indication of the actual profits for the year.

With the profit/loss figure, when calculating the Total Annual Fixed Costs, the depreciation is taken into account and is shown as a cost (your asset is worth less than it was worth a year previous). The repayments of the loan are shown as income, as you now own more of the vessel than you did a year ago. The resultant total gives a better indication of the actual annual profit and it is on these figures you would be more likely to pay tax, if this was required in your country.

PROFIT AND LOSS SCREEN

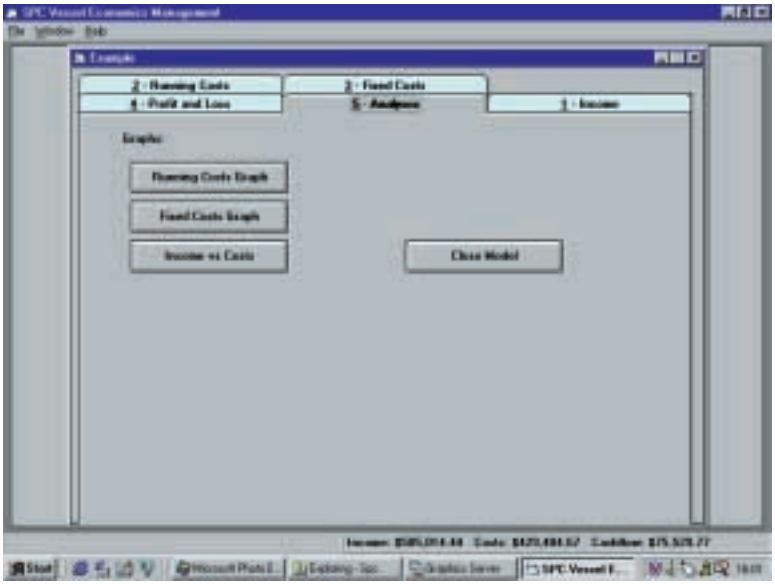
This screen shows, in yellow boxes, the annual totals of the income, running costs and fixed cost screens. The final Profit/Loss figure will be calculated by clicking on the gray button. At this time a full set of figures will have been calculated and the figures for Income, Total Costs and Cashflow Profit will appear as a footer at the bottom right hand corner of every screen.



By using the appropriate annual fixed costs, as previously generated in the fixed costs screen, the final Profit/Loss will show both the cashflow and actual profit/loss situation, as both a cashflow (no depreciation) and actual (depreciation) profit/loss. Figures shown in red indicate a loss situation.

THE ANALYSIS SCREEN

This screen allows you to see the results of all calculations displayed as pie charts.

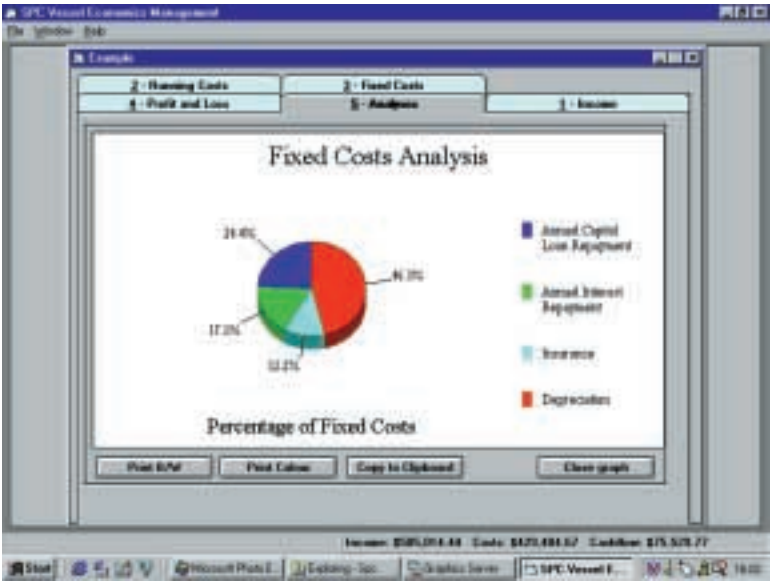


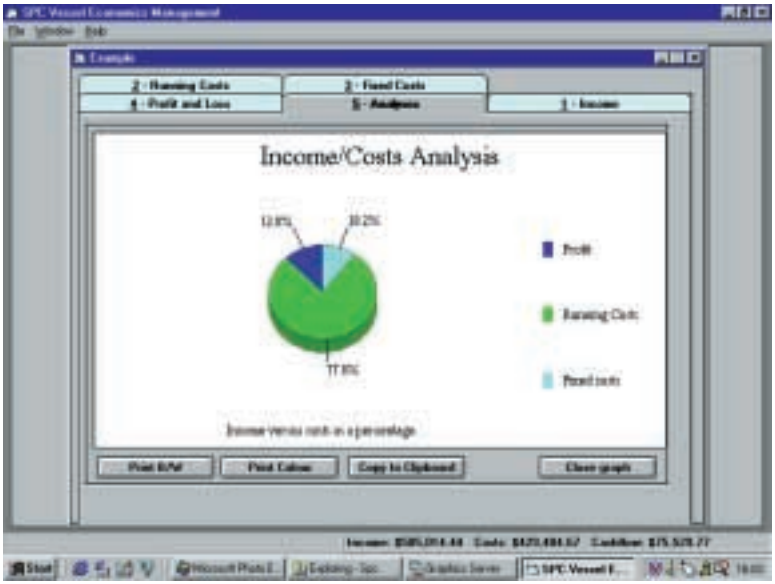
The options on this screen are :

- To view a pie chart of running costs with each cost shown as a percentage of the total running costs.
- To view a pie chart of fixed costs with each cost shown as a percentage of total fixed costs.
- To view a pie chart showing the profit as a percentage of costs against income.

You can also close the model you are working on from this screen.

SAMPLE ANALYSIS PIE CHARTS




Income/Costs Analysis
12.8%
10.2%
77.0%
Profit
Running Costs
Fixed costs
Income versus cost in a percentage
Print B/W
Print Colour
Copy to Clipboard
Close graph

EXAMPLE MODEL

A specimen file called "Example" is loaded in the menu of this program. This is a complete file based, very loosely, on figures for long-line fishing vessels from Hawaii which target tuna. All of the data used to complete this file is listed below. You may use this file as follows:

1. As practice in entering the data by using the data listed below to complete your own model, then compare this with the loaded model.

Then,

2. Name and save your own file, then use it to adjust the figures and see what happens to the totals, especially the profit.

Data for example model

Financial figures in this case are US$

Income screen

Hooks set per day	1500
Fish caught:	
BIGEYE, CPUE	= 0.09, 80% at $14.00 and 20% at $5.00
YELLOWFIN, CPUE	= 0.14, 10% at $15.00 and 90% at $2.80
SWORDFISH, CPUE	= 0.018, 100% at $3.17
MIXED SPECIES, CPUE	= 0.19, 100% at $2.85
No of trips per year	= 15.7
Days steaming per trip	= 7.0
Days fishing per trip	= 9.5

Running costs screen

Ice	Price per kilo	= 0.25
	Kg ice to kg fish	= 1.0
Bait	Price per kg	= 2.27
	Baits per kilo	= 9.0
	Wastage	= 10%
Fuel	HP	= 500
	Price per litre	= 0.25
	Lub factor	= 2
	Efficiency factor	= 90%
Gear and maintenance		
	Basic cost	= 20,000.0
	Daily amount	= 200.0
Wages		
	Fixed	= Nil
	% age of gross	= 25%
Victualling		= 70.00 per day at sea

Fixed costs screen

Vessel value	= 236,000.00
Amount owed	= 180,000.00
Repayment period	= 10 years
Interest Rate	= 7%
Depreciation Method	= DV
Insurance	= 5% of value of boat.
Period for Depreciation	= 15 years
Scrap value	= 50,000.00

AVERAGE DATA

Some representative prices and CPUE, from around the region for 1999, are listed below.

CPUE kg/hook

Flag	YFT	ALB	BET	STRIPED	BLUE	SWORD
FJ	.055	.275	.038	.006	.012	.006
FM	.162	.000	.096	.002	.009	.002
NC	.238	.344	.024	.049	.005	.005
PF	.059	.314	.040	018	.048	.010
PG	.382	.093	.047	.001	.002	.001
SB	.194	.029	.167	.001	.001	.002
TO	.047	.393	.054	.017	.015	.004

YFT – Yellowfin tuna
ALB – Albacore tuna
BET – Bigeye tuna
STRIPED – Striped marlin
BLUE – Blue marlin
SWORD – Swordfish.

FJ – Fiji
FM – Federated States of Micronesia
NC – New Caledonia
PF – French Polynesia
PG – Papua New Guinea
SB – Solomon Islands
TO – Tonga

Average prices:

Bait

In Hawaii, a 10kg box of Sanma costs between US$15 to US$20 with 10 to 12 pieces per kilo.

In Fiji, Sanma is $38 per 10 kg box while sardines and mackerel is $28 per 10 kg box.

Fuel

In Hawaii fuel costs US$0.23 per litre.

In Fiji fuel costs F$.56 per litre.

Ice

Ice in Fiji is F$1200 per ton (0.12 per litre.)

Maintenance

An average sized tuna longliner out of Hawaii was spending $26,000 per year on maintenance.

Crew wages and victualling

These vary considerably from country to country and circumstance to circumstance.